

STANDARDS DEVELOPMENT BRANCH MOE



36936000010589

1971

*Terry.*  
OPERATING  
SUMMARY

TD  
434  
.A56  
1971  
MOE

O.W.R.C.  
WATER SUPPLY SYSTEM

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**TD  
434  
.A56  
1971**

1971 annual operating summary,  
: water treatment plants.

80684

**ONTARIO WATER RESOURCES COMMISSION**

**1971 ANNUAL OPERATING SUMMARY**

**WATER TREATMENT PLANTS**

**Prepared by the Project Services Section**

**September, 1972**

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PLANTS INCLUDED IN REPORT

PROJECT	NOMINAL CAPACITY mgd	DESCRIPTION	PROJECT	NOMINAL CAPACITY mgd	DESCRIPTION
<u>GROUND WATER PROJECTS</u>			<u>SURFACE WATER PROJECTS</u>		
Alfred		PLL PHL CL	Amherstburg	4	PLL PHL FLOC S FIL CL
Anson Hinden & Minden		PO CL	Bancroft		GS CL
Blind River		PO	Beaterton	0.55	PLL PHL FIL CL
Bolton		PO CL	Blenheim	1	PLL S FLOC FIL CL
Bracebridge		PO CL	Bobcaygeon	0.2	PLL FIL CL
Bradford		PO CL	Cache Bay		GS CL
Brantford Twp.		PO CL	Chalk River		PO CL
Brock Twp.			Dunnville	20.5	PLL PHL MIC CL
Caledon East		PHL PLL	Dresden	0.5	PLL PHL S FLOC CL
Chesterville		PO CL	Ear Falls	0.14	PO CL
Clarke Twp.		PO	Eganville	0.18	P FIL CL
Cookstown		PO CL	Elgin Area - Booster Station	3.5	P CL
Elmvale		PO	- St. Thomas	3.3	PLL PHL S FIL CL
Fauquier Twp.	0.07	PLL FIL CL	- Port Stanley	10	PLL PHL S FIL CL
Frankford	0.54	PO	- Wells	0.4	PO CL
King Twp. - Schomberg	0.14	PO S CL	Emo Twp.	0.09	PLL PHL S FIL CL
Markham - Don Mills	1	PHL CL	Espanola	1.5	PLL CL
- Steeles Ave.	1	PHL FIL CL	Fencelon Falls	0.36	PLL FIL PHL CL
Mitchell	0.72	PLL PHL FIL CL	Geraldton		PO CL
Newcastle		PO CL	Goderich	1.5	PLL PHL S FLOC FIL CL
Orangeville			Hastings		PO CL
Port Perry		PO	Haileybury	1.5	PLL S FIL CL
Preston		PO CL	Lake Huron	7	PLL PHL FLOC FIL CL
Ratter & Dunnett		PO	Marmora	0.23	PLL FIL CL
Richmond Hill - Oak Ridges	0.47	P FIL CL	Meaford	2.88	PLL PHL FLOC FIL CL
South Peel - Brampton	1.8	P FIL CL	Moosonee	0.11	PLL PHL S FLOC FIL CL
- Chinguacousy Wells	1	PO CL	Red Lake	0.25	PO CL
Stayner		PO CL	Southampton	1	PLL FIL CL
Thedford		PO CL	South Peel - Lakeview	24	PLL S FLOC FIL CL
Vankleek Hill		PO CL	Union	10	PLL PHL MIC S FLOC FIL CL
Wellington		PO CL	Watford, Wyoming & Plympton		PO (pipeline)
Whitby Twp.	0.16	PLL PHL FIL CL	Warkworth	0.1	PLL PHL S FIL CL
Winchester		PO CL			

## INTRODUCTION

The first summary of water treatment plant operation was prepared in 1967. It was a summary of the data then being collected. Since that time, changes have been made to allow collection of more relevant data and to improve methods of collection and presentation.

This report contains summaries of operating costs and treatment results. There is no attempt made to delineate operating problems at individual plants. The nature of these problems, along with more detailed data, is contained in individual plant operating summaries.



## **PLANT FLOWS**

Graph No. 1 displays average and maximum daily flows as percentages of nominal capacity of the treatment plant. The plants are ranked in order of decreasing average loadings. The nominal capacities used must be considered maxima since they do not include reductions in potential output due to backwashing of filters.

Tables I and II summarize plant output during 1971. Some of the plants were not operated for the entire year. In the Elgin Area W.S.S., the St. Thomas plant was operated until September 30, the plant at Port Stanley began operation in August, and up to August, the booster station supplied raw water to the industrial consumers and to the St. Thomas plant. The water treatment plant in Haileybury began operation in November. The water supply system at Watford purchases water from Sarnia.

# FLOWS

TABLE I

PROJECT	NOMINAL CAPACITY mgd	TOTAL OUTPUT million gallons	AVERAGE DEMAND thousand gallons/day	MAXIMUM DAY thousand gallons/day
<u>GROUND WATER PROJECTS</u>				
Alfred		18.2	50	125
Anson Hinden & Minden		13.2*	36	89
Blind River		30.1*	82	231
Bolton		89.32	240	570
Bracebridge		93.12	250	340
Bradford		146*	400	500
Brantford Twp.		20.3	56	420
Brock Twp.		20.6	56	118
Caledon East		18.0	50	290
Chesterville		23.4	64	144
Clarke Twp.		15.2	42	138
Cookstown		123.	340	890
Elmvale		36.2	100	210
Fauquier Twp.	0.07	14.8	41	59
Frankford		47.8	131	294
Hanover		9.43	30	-
King Twp. - Schomberg	0.14	15.5	42	91
Markham - Don Mills	1.0	326.	950	1530
- Steeles Ave.	1.0	225.	1040	-
Mitchell		173*	476	603
Newcastle		17.9	49	101
Orangeville		301*	830	-
Port Perry		99.2	270	480
Preston		130.3	360	-
Ratter & Dunnett		11.0	31	80
Richmond Hill		124.	345	597
- Oak Ridges	0.47	350*	960	260
South Peel - Brampton	1.8	54.4	3370	-
- Wells	1.0	573	1560	-
Stayner		88.1*	207	-
Thedford		5.97	42	90
Vankleek Hill		24.8	68	120
Wellington		22.9	63	139
Whitby Twp.	1.6	27.8	80	160
Winchester		61.9*	180	-

# FLOWS

TABLE II

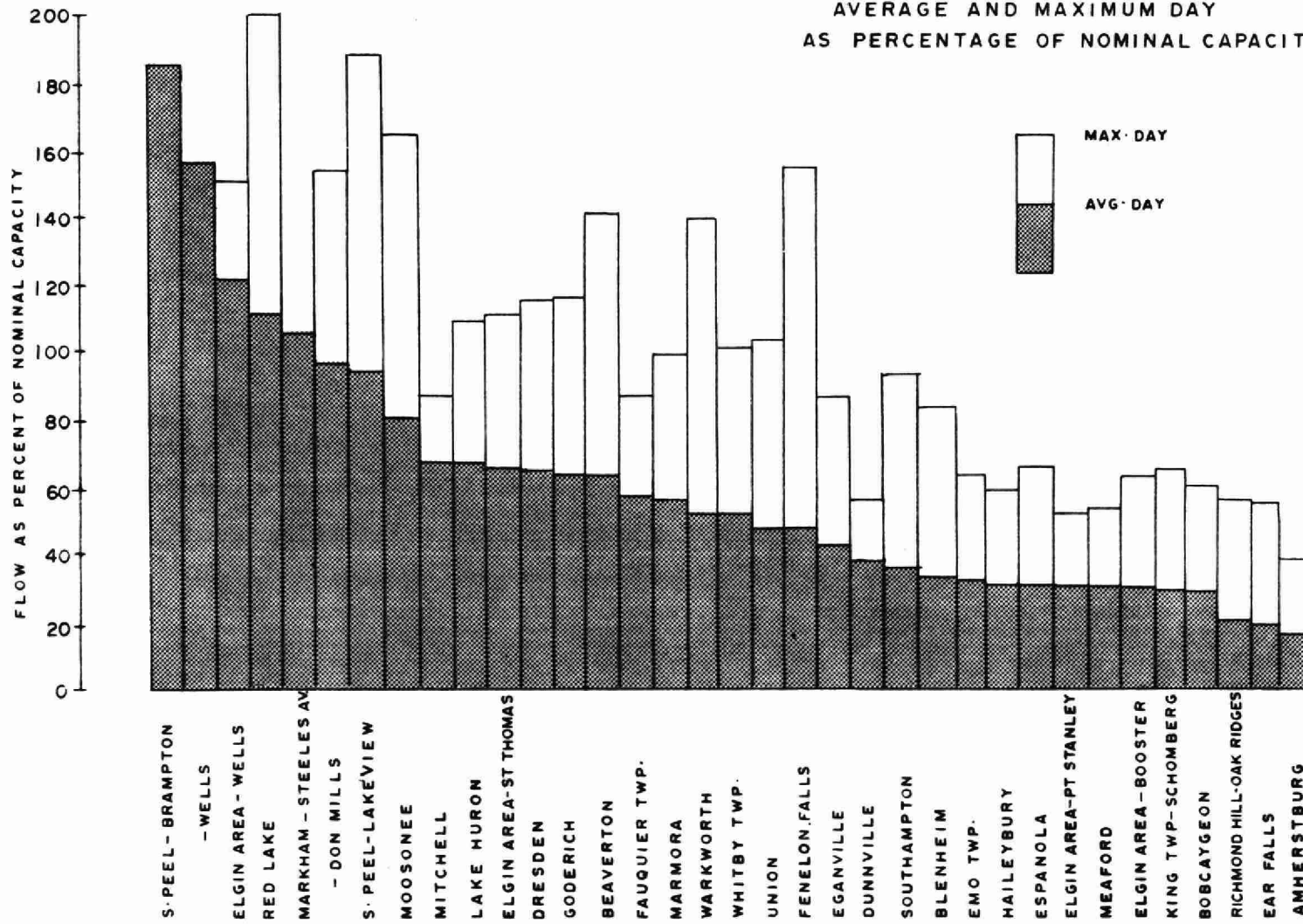
PROJECT	NOMINAL CAPACITY mgd	TOTAL OUTPUT million gallons	AVERAGE DEMAND thousand gallons/day	MAXIMUM DAY thousand gallons/day
<u>SURFACE WATER PROJECTS</u>				
Amherstburg	4.0	65.7	715	152
Bancroft		24.7	6	86
Beaverton	0.55	125. *	340	77
Blenheim	1.0	122	335	832
Bobcaygeon	0.2	22.4	61	121
Cache Bay		13.1	5	88
Chalk River		25.5	70	245
Dunnville	20.5	2970.	8140	11200
Dresden	0.5	114.	313	571
Ear Falls	0.14	9.57	26	75
Eganville	0.18	28.4	78	153
Elgin Area W. S. S. - Booster Stn.	3.5	208.7	1100	2160
- St. Thomas	3.3	584.8	2140	3640
- Port Stanley	10.	496.	3220	5010
- Wells	0.4	132.09	480	600
Emo Twp.	0.09	11.3	31	57
Espanola	1.5	176. *	480	940
Fenelon Falls	0.36	60.6	166	562
Geraldton		184.	505	2160
Goderich	1.5	338.	930	1710
Hastings		19.9	55	200
Haileybury	1.5		495	885
Lake Huron		887.3	24300	40000
Marmora	0.23	45.9	126	224
Meaford	2.88	321.06	880	1540
Moosonee	0.11	32.0	87	184
Red Lake	0.250	100.	274	499
Southampton	1.0	131.	360	919
South Peel - Lakeview	24.0	8142	22300	44100
Union	10.0	1696	4640	10200
Watford		61.6	169	218
Warkworth	0.10	17.9	50	39

\* Estimated flows

GRAPH no. 1

# PLANT FLOWS

AVERAGE AND MAXIMUM DAY  
AS PERCENTAGE OF NOMINAL CAPACITY



## **WATER QUALITY**

Physical characteristics of the water are summarized in Tables III and IV. As well as average values of turbidity and color, the maxima recorded for the year are shown since the consumer tends to remember only the most adverse conditions. It should be noted that at many of the projects, no treatment is afforded the water to remove turbidity or color and hence figures for raw and treated waters at these projects are identical (within sampling and analytical errors).

Tables V and VI list average values of the most commonly used chemical characteristics. There would, of course, be no changes in these characteristics where no treatment is provided. Even at plants where "complete" treatment is carried out, no changes in chemical characteristics would be expected. It is only at softening plants and iron removal plants where a reduction in a specific characteristic is noted.

Tables VII and VIII summarize bacteriological sampling carried out during the year. The number of samples required vary with the source of the raw water and with the population served. In projects where the water is delivered to a municipality for distribution, the samples shown as being from the distribution system are taken at the end of our system (at the point of acceptance).

# PHYSICAL CHARACTERISTICS

TABLE III

PROJECT	TURBIDITY in Jackson Turbidity Units				COLOR in Apparent Color Units				TEMPERATURE in Fahrenheit Degrees		
	RAW		TREATED		RAW		TREATED		AVG.	MAX.	MIN.
	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.			
<u>GROUND WATER PROJECTS</u>											
Blind River	1	1	-	-	20	20	-	-	-	-	-
Elmvale	2	2	1	1	< 5	< 5	< 5	< 5	-	-	-
King Twp. - Schomberg	6	10	2	3	31	70	10	15	-	-	-
Mitchell	5	6	3	4	17.5	20	< 5	< 5	-	-	-
Richmond Hill	1	1	1.5	1.5	< 5	< 5	< 5	< 5	-	-	-
Whitby Twp.	8	8	3	3	15	15	< 5	< 5	-	-	-

# PHYSICAL CHARACTERISTICS

TABLE IV

PROJECT	TURBIDITY in Jackson Turbidity Units				COLOR in Apparent Color Units				TEMPERATURE in Fahrenheit Degrees		
	RAW		TREATED		RAW		TREATED		AVG.	MAX.	MIN.
	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.			
SURFACE WATER PROJECTS											
Amherstburg	10.0	34	0.2	0.6	10	10	5	5	54	70	41
Bancroft	3	4	-	-	11	20	-	-	-	-	-
Beaverton	3	4	2	4	8	15	6	10	-	-	-
Blenheim	6	20	< 1	1	14	80	< 5	5	51	72	33
Bobcaygeon	4	8	1	1	17	20	5	10	-	-	-
Cache Bay	1	1	-	-	40	40	-	-	-	-	-
Chalk River	2.2	3	-	-	34	50	-	-	-	-	-
Dunnville	9.4	71	*	*	7	15	*	*	-	-	-
Dresden	98	300	1.3	5	-	-	-	-	51	78	28
Ear Falls	6.6	13	*	*	37	50	*	*	-	-	-
Eganville	3	3	-	-	15	20	-	-	-	-	-
Emo Twp.	5.2	15	1.7	4	46	60	< 5	< 5	-	-	-
Espanola	3	8	*	*	4	20	*	*	-	-	-
Fenelon Falls	2	2	1.5	1.5	10	10	< 5	< 5	-	-	-
Geraldton	1.2	4	*	*	6	20	*	*	-	-	-
Goderich	12.5	100	1.	1.6	1.2	70	< 5	10	47	72	33
Haileybury	21	50	7	20	67	125	23	40	-	-	-
Harrow	5.3	8	5.5	8	6	10	8	10	-	-	-
Lake Erie -											
- Booster Station	8	-	-	-	5	-	-	-	46	69	35
- Wells	-	-	< 1	-	-	-	< 5	-	-	-	-
- St. Thomas	17	-	< 1	-	-	-	< 5	-	50	80	32
- Port Stanley	44	-	.5	1.1	-	-	1	10	-	-	-
Lake Huron	5.7	48	0.36	34	< 5	-	< 5	< 5	48	73	33
Marmora	2.4	6	2	3	24	40	14	25	-	-	-
Meaford	16.	12.4	1	5.6	< 5	< 5	< 5	< 5	45	67	31
Moosonee - Winter	3	4	2	2	132	200	7.5	15	39	58	32
- Summer	40	105	2.6	4	38	125	8.7	20	-	-	-
Red Lake	1.4	4.3	*	*	21	50	*	*	-	-	-
Southampton	7	10	1.8	2	23	40	5	5	-	-	-
South Peel - Lakeview	7.8	53	1.7	2.6	5	5	5	5	48	77	33
Union	9.7	50	.7	1.3	8	20	< 5	5	54	71	33
Warkworth	1	1	1	1	5	5	5	5	-	-	-

\* As treatment does not significantly effect characteristics, raw and treated values are grouped.

# CHEMICAL CHARACTERISTICS

TABLE V

PROJECT	HARDNESS mg/l CaCO <sub>3</sub>		ALKALINITY mg/l CaCO <sub>3</sub>		IRON mg/l Fe		CHLORIDE mg/l Cl <sup>-</sup>		pH	
	RAW	TREATED	RAW	TREATED	RAW	TREATED	RAW	TREATED	RAW	TREATED
<b>GROUND WATER PROJECTS</b>										
Alfred	-	290	-	405	-	1.30	-	815	-	7.7
Anson, Hinden, Minden	118	-	90	-	.47	-	5	-	8.2	-
Blind River	144	-	140	-	.21	-	12	-	7.8	-
Bolton	204	-	219	-	.83	-	31	-	7.8	-
Clarke Twp.	298	-	249	-	<.05	-	16	-	7.4	-
Emlvale	204	176	198	180	.08	.05	9	4	8.0	8.0
Fauquier Twp.	336	-	340	-	1.3	-	4	-	7.6	-
Frankford	289	-	236	-	.05	-	-	-	7.6	-
King Twp. - Schomberg	179	58	335	402	1.50	.58	3	5	7.8	8.7
Markham Twp.										
- Don Mills	343	-	310	-	.99	.25	53	-	7.9	-
- German Mills	307	-	241	-	.34	-	40	-	7.3	-
Mitchell	262	246	200	200	.15	.05	8	8	7.7	7.6
Richmond Hill										
- Oak Ridges	196	114	338	354	1.0	.48	6	5	7.8	8.1
South Peel W.S.S.										
- Brampton Plant	-	585	-	357	-	.13	-	10	-	7.2
- Wells	-	266	-	251	-	.59	-	14	-	7.8
Whitby Twp.	267	266	244	198	.71	.33	60	8	7.4	7.4
Wellington	351	-	299		1.48	-	49	-	7.4	-



TABLE VI

## CHEMICAL CHARACTERISTICS

PROJECT	HARDNESS mg/l CaCO <sub>3</sub>		ALKALINITY mg/l CaCO <sub>3</sub>		IRON mg/l Fe		CHLORIDE mg/l Cl <sup>-</sup>		pH	
	RAW	TREATED	RAW	TREATED	RAW	TREATED	RAW	TREATED	RAW	TREATED
<b>SURFACE WATER PROJECTS</b>										
Amherstburg	114	115	78	71	.85	.06	21	23	8.0	7.5
Bancroft	41	-	32	-	.09	-	2	-	7.7	-
Beaverton	149	150	127	126	.12	.07	11	12	8.3	8.2
Blenheim	134	136	93	84	.39	.06	22	23	7.9	7.5
Bobcaygeon	72	76	57	51	.10	.10	4	6	7.6	7.4
Cache Bay	24	-	12	-	.15	-	1	-	7.3	-
Chalk River	22	-	15	-	.39	-	3	-	7.6	-
Dunnville	145	-	104	-	.21	-	27	-	8.2	-
Dresden	263	156	173	53	1.41	.19	18	20	8.0	8.9
Ear Falls	36	36	35	36	.44	.41	0	6	7.2	7.1
Eganville	57	-	44	-	.22	-	7	5	7.7	-
Elgin Area W. S. S.										
- Booster Station	140	-	90	-	0.15	-	26	-	8.0	-
- St. Thomas Plant	-	270	-	170	-	0.05	-	20	-	7.9
- Port Stanley Plant	-	144	-	96	-	0.16	-	26	-	7.6
- Wells	-	88	-	150	-	0.10	-	73	-	8.1
Emo Twp.	27	29	27	50	.25	.09	<1	5	7.1	7.4
Espanola	31	30	20	17	.11	.10	5	6	7.5	6.9
Fenelon Falls	114	117	94	88	.55	.11	12	13	8.1	7.7
Geraldton	131	135	125	125	.19	.10	1	3	8.0	7.6
Goderich	114	117	94	88	.55	.11	12	13	8.1	7.7
Haileybury	30	32	18	15	2.73	.66	4	4	7.3	7.2
Harrow	118	121	81	77	.62	-	-	-	-	-
Lake Huron	-	103	-	76	-	.06	-	7	-	7.8
Marmora	86	85	70	66	.11	.07	3	6	7.9	7.7
Meaford	90	90	74	72	Tr	Tr	5	6	8.2	8.0
Michipicoten	68	-	41	-	0.6	-	2	-	7.6	-
Moosonee	141	144	127	135	1.62	.09	97	102	7.7	7.6
Red Lake	30	25	25	19	.13	.12	<1	3	7.3	7.0
Southampton	195	81	212	317	1.05	.66	5	7	7.7	8.8
South Peel										
- Lakeview	136	139	97	92	.29	.06	31	31	8.0	7.7
Union	120	120	81	69	.40	.50	21	23	8.0	7.4
Warkworth	222	222	202	198	.15	-	3	5	8.0	8.0

TABLE VII

## BACTERIOLOGICAL QUALITY

TABLE VII

PROJECT	CHLORINE RESIDUAL mg/l	RAW WATER					TREATED WATER		DISTRIBUTION SYSTEM	
		Number of samples having Total Coliforms ( per 100 ml.) of :								
		0	1 - 3	4 - 32	33 - 320	> 320	0	> 0	0	> 0
<u>GROUND WATER PLANTS</u>										
Alfred	.4	10	3	13	8	4	65	5	35	1
Anson, Hinden, Minden	.3	0	0	0	0	0	0	0	60	0
Blind River	-	28	0	1	0	0	153	1	0	0
Bolton	-	11	0	0	0	0	0	0	4	1
Brock Twp.	-	22	0	0	0	0	1	0	20	0
Caledon East	-	14	0	0	0	0	0	0	10	0
Chesterville	.5	9	0	0	2	0	5	1	39	1
Clarence Twp.	-	11	0	0	0	0	16	0	0	0
Clarke Twp.	-	14	0	0	0	0	45	0	0	0
Cookstown	-	10	0	0	0	0	0	0	33	0
Elmvale	-	93	1	0	0	0	0	0	84	15
Fauquier Twp.	.4	4	0	0	0	0	3	0	8	0
Hanover	-	14	2	3	0	0	10	0	3	0
King Twp. - Schomberg	-	23	0	0	0	0	22	0	42	0
Markham	.5	76	0	0	0	0	39	0	122	1
Mitchell	.4	55	1	0	0	0	36	0	72	0
Newcastle	-	10	0	0	0	0	0	0	29	0
Port Perry	1.0	13	0	0	0	0	13	0	29	2
Playfair Twp.	-	5	0	0	0	0	0	0	1	0
Preston	-	0	0	0	0	0	0	0	32	0
Ratter & Dunnett	-	7	0	0	0	0	0	0	11	0
Richmond Hill -	-	6	0	0	0	0	7	0	43	0
- Oak Ridges	-	4	0	0	0	0	3	0	5	0
South Peel -	-	0	0	0	0	0	52	5	0	2
- Brampton	-	36	0	0	0	0	196	1	0	0
- Chinguacousy Wells	-	58	0	0	1	0	4	0	94	0
Stayner	-	23	0	0	0	0	24	0	45	0
Thedford	-	47	7	8	2	0	65	0	105	0
Vankleek Hill	.5	14	0	0	0	0	15	0	34	0
Whitby Twp.	-	46	1	0	0	0	30	1	191	0
Winchester	.6	22	9	16	13	9	34	4	85	2
Wellington	.7									

# BACTERIOLOGICAL QUALITY

TABLE VIII

PROJECT	CHLORINE RESIDUAL  mg/l	RAW WATER					TREATED WATER		DISTRIBUTION SYSTEM	
		Number of samples having Total Coliforms (per 100 ml) of:								
		0	1 - 3	4 - 32	32 - 320	> 320	0	> 0	0	> 0
<u>SURFACE WATER</u>										
Amherstburg	.6	0	0	0	0	13	13	0	37	0
Banbroft	.5	15	6	7	4	0	41	0	145	0
Beaverton	.5	4	0	4	4	1	13	0	39	1
Blenheim	.7	19	6	11	5	2	41	1	29	0
Bobcaygeon	.5	4	0	4	4	1	13	0	39	1
Cache Bay	-	14	4	4	1	0	45	1	0	0
Chalk River	.5	2	7	15	6	0	50	0	145	1
Dunnville	.5	7	4	12	11	10	41	2	91	0
Dresden	1.1	0	0	1	6	30	0	0	47	4
Ear Falls	.4	8	3	10	0	0	46	0	48	1
Eganville	.5	29	2	4	3	0	162	2	0	0
Elgin Area - W. S. S.										
- Port Stanley	-	1	1	7	3	0	164	0	0	0
- St. Thomas	.7	0	0	1	4	32	160	0	0	0
- Wells	1.0	-	-	-	-	-	103	0	0	0
Emo Twp.	.7	0	0	0	0	14	13	1	76	0
Espanola	.9	2	3	9	2	0	16	2	139	11
Fenelon Falls	.5	4	3	8	13	13	29	0	167	1
Goderich	.6	9	8	15	8	3	47	0	175	0
Hastings	1.0	0	0	0	0	0	5	1	217	12
Haileybury	.6	0	0	0	0	0	12	0	12	0
Harrow	-	5	2	11	21	8	45	2	96	0
Lake Huron	.4	176	4	0	0	0	371	0	600	0
Marmora	.5	0	1	5	2	0	12	0	20	0
Meaford	.3	2	0	0	2	0	24	0	76	0
Michipicoten	-	2	0	0	2	0	24	0	76	0
Moosonee	.5	16	6	6	2	0	18	2	0	0
Red Lake	.9	0	0	0	0	0	50	2	48	1
Southampton	.5	10	1	0	0	0	0	0	36	0
South Peel - Lakeview	.3	6	4	17	20	6	50	1	237	3
Union	.7	10	0	23	16	3	51	0	494	3
Watford, Wyoming Plympton	-	3	0	0	0	0	0	0	5	0
Warkworth	-	1	0	5	33	2	41	0	80	3

## **PROCESS DATA**

### ALGAE

The results of raw water algae enumeration are shown in Table IX. Geometric means were used to minimize the effect of extreme values. Data on microstrainer performance is available from only one plant. These are shown in Table X.

### CHEMICALS USED

Chemicals used in the treatment process are listed in Tables XI and XII for ground and surface waters respectively. The figures shown represent the total amounts of the delivered chemical used during the year. It should be noted that some of the plants were not operated for the entire year.

### FILTER OPERATION

The data available on filter operation are summarized in Table XIII.

TABLE IX

**TOTAL ALGAE - Raw Water**

Note: Values listed are TOTAL ALGAE in A.S.U. per ml.

PROJECT	1971	AVERAGE MONTHLY VALUES											
	AVERAGE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dunnville	200	101	47	84	178	274	291	157	239	148	348	233	301
Goderich	711	-	153	111	-	1677	1630	-	-	-	498	607	303
Lake Huron	362	165	64	62	312	447	1549	303	216	516	247	308	153
South Peel	209	112	42	93	180	431	181	255	202	203	186	275	344
Union	5150	5590	6410	6900	5490	3030	2560	3580	11350	7930	3070	2510	3450

TABLE X

**MICROSTRAINER PERFORMANCE**

PROJECT	TOTAL			BLUE-GREEN			GREEN			FLAGELLATES			DIATOMS		
	ASU/ml		% Red <sup>n</sup>	ASU/ml		% Red <sup>n</sup>	ASU/ml		% Red <sup>n</sup>	ASU/ml		% Red <sup>n</sup>	ASU/ml		% Red <sup>n</sup>
	App	Eff.		App	Eff.		App	Eff.		App	Eff.		App	Eff.	
Dunnville	2399	-	-	156	-	-	705	-	-	98	-	-	1440	-	-
Union	5416	2376	56	267	164	39	1115	504	55	156	313	-	3878	1395	64

TABLE XI

## CHEMICALS USED

PROJECT	LIQUID CHLORINE 10 <sup>3</sup> pounds	SODIUM HYPOCHLORITE gallons	CALGON 10 <sup>3</sup> pounds	SODIUM SILICATE 10 <sup>3</sup> pounds
Alfred		370		
Brantford Twp.		80		
Chesterville		4350		
Elgin Area - Wells	1.4			
Fauquier Twp.		250		
Markham Twp.				
- Steeles Ave. Plant	1.0			
- Don Mills	3.9			51
- John Street	1.7			
Newcastle		1730		
South Peel-				
-Chinguacousy Wells		410	38	

TABLE XII

## CHEMICALS USED

PROJECT	CHLORINE		Ammonium Sulfate 10 <sup>3</sup> lb	D. E. 10 <sup>3</sup> lb	ALUM		Sodium Silicate 10 <sup>3</sup> pounds	Polymer pounds	Lime 10 <sup>3</sup> pounds	Soda Ash 10 <sup>3</sup> lb	Sodium Bicarb. 10 <sup>3</sup> lb	Activated Carbon 10 <sup>3</sup> lb	Sodium Chlorite 10 <sup>3</sup> lb	KMnO <sub>4</sub> 10 <sup>3</sup> lb	FLUORIDE	
	LIQUID Cl <sub>2</sub>	NaOCl			LIQUID	DRY									H <sub>2</sub> SiF <sub>6</sub>	Na <sub>2</sub> SiF <sub>6</sub>
	10 <sup>3</sup> pounds	gallons			10 <sup>3</sup> gallons	10 <sup>3</sup> pounds									gallons	10 <sup>3</sup> pounds
Bancroft		1320														
Beaverton	1.9															
Blenheim	2.5				0.5	18.	2									
Bobcaygeon	0.7			10.												
Cache Bay		2520														
Chalk River	875															
Dunnville	29.															
Dresden	1.8				5.6		12		131.		2.9			1.0		
Ear Falls	0.7															
Elgin Area																
- St. Thomas Plant	13.		5			119.						15				8.9
- Booster Station	1.4															
- Port Stanley Plant	12.					105.										
Emo Twp.	0.4						2.7			4.0	0.8					
Espanola	1.5															1.2
Fenelon Falls	1.5															
Geraldton	4.9															
Goderich	4.4				41.		2.9				0.7					3.9
Hastings	0.7															
Haileybury	0.5				4.5	0.8	0.6		12.							
Lake Huron	85.				113.											
Marmora	1.6			12.												
Meaford	3.3															
Moosonee		810				34.		23	0.2	18.					23	
Red Lake	3.2															
Southampton	1.8			16.												
South Peel																
- Lakeview Plant	115.				80.								46.			337.
Warkworth		4500			18.											

TABLE XIII

## FILTER OPERATION

PROJECT	TYPE OF FILTER	NUMBER AND AREA OF FILTERS n x ft	AVERAGE TURBIDITY in Jackson Turbidity Units		FILTER RUN in hours		BACKWASH WATER USED
			APPLIED	EFFLUENT	AVERAGE	MINIMUM	% of output
Amherstburg	G, A+S	4x416	-	0.2	-	-	-
Blenheim	G, S	3x78	0.8	0.02	10	3.7	8
Bobcaygeon	V, DE	1x180	4	1	-	-	3
Beaverton	P, S	4x63	-	2	-	-	-
Brampton *	-	-	-	-	-	-	-
Eganville	G, S	2x38	-	-	-	-	-
Fauquier Twp. *	P, S	2x13	-	-	-	-	-
Fenelon Falls	P, S	2x50	2	1.5	-	-	1
Goderich	G, A+S	4x144	3.5	1	45	10	2
Lake Erie - St. Thomas	G, S	4x400	4.0	0.56	33	12	2
- Port Stanley	G, A+S	4x1040	-	1.6	62	13	-
Lake Huron	G, A+S	12x1100	-	0.4	41	2.5	6
Lakeview	G, A+S	14x1058	-	1.7	45	18	2
Marmora	V, DE	8x16	-	2	-	-	-
Meaford	G, A	2x625	-	-	-	-	4
Mitchell	P, A	1x200	-	-	-	-	-
Moosonee	G, S	2x28	-	-	-	-	-
Southampton	P, DE	2x206	-	0.8	39	-	-
Union	G, S	4x650	2.4	0.7	-	-	3
Warkworth	G, S	1x35	-	1	-	-	-
Whitby *	P, S	1x44	-	3	-	-	-

\* Iron Removal Plant

G - Gravity Filter

V - Vacuum Filter

DE - Diatomaceous Earth

P - Pressure

S - Sand

A - Anthracite



## **PLANT STAFF**

Table XIV lists number of personnel employed in each job classification. Full-time staff at Ear Falls-Red Lake, Emo Township, Espanola, Frankford, Haileybury and Moosonee also operate water pollution control plants. King Township (Schomberg), Meaford, Southampton, Warkworth (Percy Township) and Whitby Township are operated on a part-time basis by employees of those municipalities. Fauquier Township (Moonbeam) employs one part-time operator for the water treatment plant and the water pollution control plant.

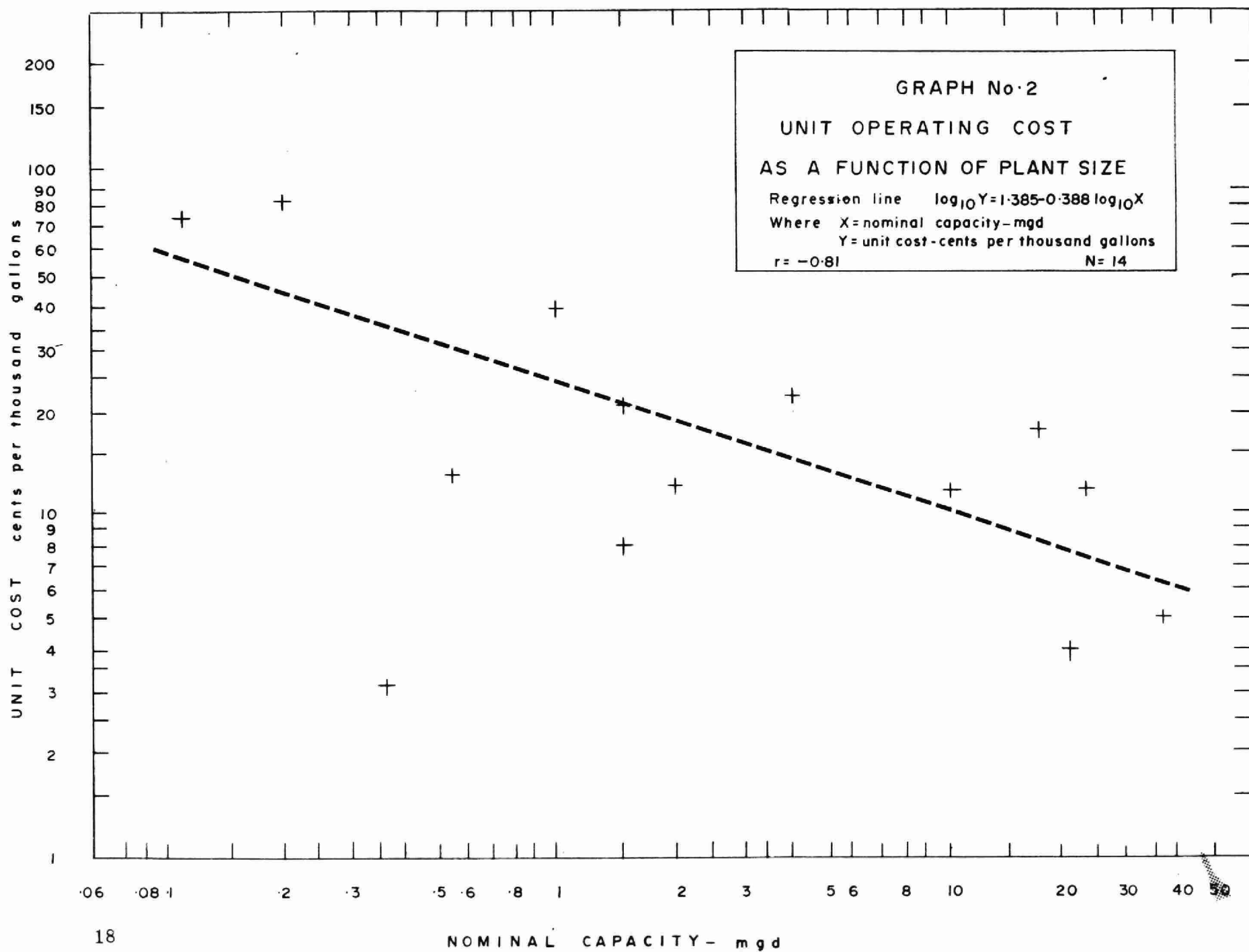


TABLE XIV

## PLANT STAFF

PROJECT	SUPERINTENDENT	ASSISTANT SUPERINTENDENT	CHIEF OPERATOR	MECHANIC	ELECTRICIAN	CONTROLS TECHNICIAN	OPERATOR	LABORER	GROUNDSKEEPER / JANITOR	CASUAL	TOTAL
Amherstburg	1						5				6.0
Bobcaygeon			1							0.4	1.4
Blenheim			1				2			1.0	4.0
Dunnville	1			1			6				8.0
Ear Falls - Red Lake			1				1				2.0
Elgin Area	1			1			6	3		1.0	12.0
Emo Twp.											
Espanola			0.5				0.5				1.0
Fauquier Twp.										0.4	0.4
Fenelon Falls			1							0.3	1.3
Frankford			1								1.
Goderich			1				4			0.6	5.6
Haileybury	0.5						3.5			0.3	5.3
King Twp. - Schomberg										0.3	0.3
Lake Huron	1			1	1	1	11	2		3.0	20.
Markham			1				2				3.0
Meaford										1.0	1.0
Moosonee			0.5				0.5			0.1	1.1
Southampton										1.0	1.0
South Peel	1		1	4		1	18	2	2	0.5	29.5
Union	1			1	1		5		2		10.0
Warkworth										0.5	0.5
Whitby Twp.										0.3	0.3

## OPERATING COSTS

The cost of operation of the water treatment plants used in this report include payroll of staff employed at the plants, fuel, power, chemicals, general supplies, equipment, repairs and maintenance, sundry, water, and travel. The cost of head office supervision, including travel, accounting, purchase and inspection, is not charged against the project.

An explanation of items included in each of the categories of the operating costs follows:

1. Payroll
  - Regular: Staff salaries, including pension, medical plant, Workmen's Compensation payments.
  - Casual: Salaries of labour employed on a temporary or part-time basis during staff shortages, or for part-time work. Workmen's Compensation payments are also included.
2. Fuel
  - Include fuel oil, natural gas or propane used for heating.
3. Power
  - Includes hydro-electric power plus natural gas, gasoline, diesel fuel, if used for power generators.
4. Chemicals
  - Includes chlorine, sodium hypochlorite, diatomaceous earth, hydrated lime, alum, activated carbon and salt.
5. General Supplies
  - Includes laboratory reagents, laboratory equipment replacement, cleaning materials, lubricants, stationery, uniforms, light bulbs, instrument charts, books, etc.
6. Equipment
  - Includes equipment to be used in the treatment process, laboratory, building, grounds, maintenance, and small tools.

- |     |                          |   |
|-----|--------------------------|---|
| 7.  | Repairs &<br>Maintenance | - Includes goods and services (excluding OWRC staff) used in the repair and maintenance of process, electrical equipment and buildings, inspections, packing materials, paints, etc.                      |
| 8.  | Sundry                   | - Includes express charges, telephone, telemetering, insurance, taxes, etc.   |
| 9.  | Water                    | - Includes all charges for water  |
| 10. | Travel                   | - Includes operators' travel to local hardware stores, railroad stations, conferences, conventions, etc. The cost of accomodation and meals associated with conferences and conventions is also included. |

Tables XV and XVI are summaries of operating expenditures for each of the budget categories listed above. In many cases, these expenditures do not reflect the total cost of operation since much of the cost, particularly labour, is supplied by the smaller communities with no direct charge to the project.

Graph No. 2 shows the relation between plant size and unit cost of operation. Because of the diverse treatment methods ranging from microstraining to complete treatment, the relation is not very good.

# OPERATING COSTS

TABLE XV

PROJECT	UNIT COST \$/thousand gallons	TOTAL	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINT.	SUNDRY	TRAVEL	WATER
<u>GROUND WATER PROJECTS</u>													
Alfred		2006.16	29.17			1477.00	231.20	7.46		185.13	75.60		
Anson, Hinden & Minden		3916.36	16.26	1867.11		1666.66	155.44	74.14		110.71	26.04		
Bolton		2480.33				2364.30	50.34		19.16	18.01	28.52		
Blind River		3070.90				2211.55				14.62	844.73		
Bracebridge		57.92									57.92		
Bradford		122.28					87.56				34.72		
Brantofrd Twp.		170.78									170.78		
Brock Twp.		953.59				859.22			5.62	70.52	18.23		
Caledon East		3371.00	9.42	997.37		1916.66		39.45			408.10		
Chesterville		447.44				752.62	402.94		95.13	2098.06	1122.69		
Clarke Twp.		2065.60				368.31				1650.00	47.29		
Cookstown		137.55						53.81			83.74		
Elmvale		2445.48									2445.08		
Fauquier Twp.		5102.67	(884.66)	2122.72		1862.72	289.57	200.48	957.26	464.08	90.50		
Frankford	13	6011.49	4361.24			935.90			310.00	84.82	319.53		
Hanover		1889.78				1855.56					24.22		
Huntsville		116.91									116.91		
King Twp. - Schomberg		5479.79	15.69	1825.66		1357.22	1589.82	131.65	211.01	102.98	133.26	112.50	
Markham Twp.	12	55905.13	32358.63		290.23	21418.29	2842.23	816.92	151.11	5169.98	1796.74	60.60	
Mitchell		120.85									120.85		
Newcastle		759.74				489.85	167.75			39.23	62.91		
Orangeville		3005.92				2509.31					496.60		
Port Perry		4141.14				2569.46	1205.55		7.44	281.46	77.23		
Plantagenet		377.78				116.53		95.05	143.79	22.41			
Playfair Twp.		1064.82				1013.73				30.60	20.49		
Preston		149.09									149.09		
Ratter & Dunnett		2096.60	10.10	1362.67		579.71				114.63	29.49		
Richmond Hill		306.49									306.49		
- Oak Ridges		3731.12	6.02	924.00		2410.94				4.27	385.89		
Sault Ste. Marie		526.22									526.22		
Stayner		190.45								126.95	63.50		
Thedford		2197.02	131.56	109.56		1165.93							
Vankleek Hill		5790.44	22.67	2684.97		1647.67	375.00	150.22	88.20	347.13	289.23	185.35	
Wellington		3421.74	22.04	2342.54		578.19	364.78	(25.95)		33.58	106.56		
Whitby Twp.		3851.17	14.59	1726.13		1279.90	529.24	63.12		78.02	160.17		
Winchester		4778.48	575.05			1911.29	1704.22	16.54	47.10	363.59	160.69		

# OPERATING COSTS

TABLE XVI

PROJECT	UNIT COST \$/thousand gallons	TOTAL	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINT.	SUNDRY	TRAVEL	WATER
<b>SURFACE WATER PROJECTS</b>													
Amherstburg	25	123475.80	26373.85	544.26		5323.74	2560.56	1785.39	12499.34		1064.01	981.79	72342.84
Bancroft		139.49									139.49		
Beaverton		263.27						33.75		71.60	157.92		
Belle River		255.56									255.56		
Blenheim	40	49374.96	17305.69	3330.27	728.29	2137.64	3228.84	1843.85	16795.21	3855.99	(127.82)	277.00	
Bobcaygeon	81	18070.45	9946.37	972.46	86.35	1517.09	1653.30	857.12		1964.82	826.10	247.84	
Cache Bay		1422.25	75.70	757.19			241.17			15.76	36.77		
Chalk River		139.76						8.05		26.71	105.00		
Dunnville	4	132099.47	70419.18		1089.84	39087.12	2906.08	2896.70	2283.43	6419.80	6585.30	422.02	(10.00)
Dresden		2195.97					1714.59			52.50	428.88		
Ear Falls		11393.77	2984.96	1244.03	77.40	2165.01	567.37	236.70		1321.32	370.29	2426.69	
Eganville		2568.38					1294.29	125.75	316.78	738.57	92.99		
Emo Twp.		8290.15	1040.67	456.00	299.16	136.04	2157.02	545.01	1599.77	430.87	1035.77	589.84	
Espanola	8	14220.70	8145.35			3384.54	769.18	62.28	666.36	513.51	247.11		432.40
Fencelon Falls	31	18950.15	10033.28	1759.94		2909.95	382.14	743.58	287.61	2043.07	674.09	116.45	
Geraldton		218.82							(0.65)	30.44	189.03		
Goderich	21	70733.84	40843.23	6474.63		8626.85	2366.49	1447.52	311.52	655.02	9513.26	495.32	
Hastings		888.28				496.84					391.43		
Haileybury		19934.70	3921.62	205.23		5021.23	4020.18	409.65	5477.42	404.00	413.93	61.44	
Harrow		970.63						403.77			566.86		
Lake Erie - Basic	18	160805.58	72728.26	10054.61	2161.88	29072.63	9600.16	3940.74	13813.33	5282.87	12549.07	1602.03	
Secondary		93099.34	13530.00	43.82	534.23	20180.62	6397.19	850.93	33751.30	16873.48	864.12	73.65	
Lake Huron	5	432055.05	142657.27	9842.90	188.19	189369.62	26208.48	4322.84	11532.15	14283.20	31770.87	1879.50	
Marmora		1771.74					1335.51			23.27	392.96		
Meaford		19575.83					(7.11)		245.07		19337.87		
Michipicoten Twp.		132.24								131.34	1.00		
Moosonee	73	23354.52	9523.32		445.60	5830.62	5693.00	464.46	53.10	397.77	583.44	363.21	
Red Lake		9037.91		(123.11)	463.88	2823.33	875.59	629.48	2839.40	1691.45			
Southampton		20337.54					3953.91	504.70	668.10	4679.38	10531.45		
South Peel - All plants	11	923211.37	299892.92	8862.27	1736.93	279319.89	48572.51	16061.90	19996.56	26255.71	211350.29	1141.75	20.64
Union	11	182403.77	90614.77	32.00	2628.93	32901.82	23634.65	5232.34	1263.22	2848.13	21548.77	1699.14	
Watford, Wyoming, Plympton *		40282.30		31.82		2345.16		18.30	148.88	4871.20	114.79	16.45	32735.70
Warkworth		4554.43	18.43	2561.71		825.39	665.35	157.11	114.04	89.44	122.96		

\* Includes cost of water purchased

Date Due


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